



1 (Once Amended)

An automatic pool cover system for operating a buoyant cover and where the cover is controlled in both opening and closing movements of said cover relative to a swimming pool, said pool cover system comprising:

- a) a rotatable cover drum for winding a buoyant cover comprised of at least one buoyant panel onto said drum and allowing unwinding of the cover from the drum to a closed position so that the cover may extend across and cover the swimming pool;
- b) a hydraulic motor for causing driving movement of the pool cover across a swimming pool to an open position and winding the cover onto the cover drum;
- c) movement control means operatively coupled to said cover drum to control a rate of movement of the cover from the cover drum while extending the cover over a swimming pool; and
- d) a travel limiting means for controlling the limits of movement of the cover to preclude movement of the cover at an end of travel to

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*B3*  
the closed position.

2 (Resubmitted)

*Q1*  
*Cont*  
The automatic pool cover system of Claim 1 further characterized that said hydraulic motor is operated by an electrical power pack remote from the hydraulic motor and from the swimming pool.

3 (Resubmitted)

The automatic pool cover system of Claim 1 further characterized in that said cover drum is located in a position where it is submerged in water and buoyant forces act upon the cover wound upon said drum to cause an unwinding thereof, and said movement control means controls movement resulting from the tendency of the cover to unwind from said cover drum.

4 (Once Amended)

The automatic pool cover system of Claim 3 further characterized in that said hydraulic motor provides a positive driving action for moving the cover to the opened position and winding the pool cover about the drum, but operates in reverse to provide a braking action to aid in preventing unwinding to thereby

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*BW*  
restrain tendency of the cover to unwind from the drum.

5 (Resubmitted)

The automatic pool cover system of Claim 3 further characterized in that said movement control means for controlling movement is a one way brake device.

*OK*  
6 (Resubmitted)

*OK*  
The automatic pool cover system <sup>of</sup> Claim 3 further characterized in that the travel limiting means is a hard stop travel limiter.

7 (Once Amended)

The automatic pool cover system of Claim 1 further characterized in that said movement control means comprises an internal brake with said hydraulic motor.

8 (Once Amended)

The automatic pool cover system of Claim 3 further characterized in that said travel limiting means comprises a rotary encoder limit switch.

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9 (Once Amended)

*Blade*  
The automatic pool cover system of Claim 3 further characterized in that said travel limiting means comprises a mechanical limit switch.

10 (Once Amended)

*Q1  
Cont.*  
The automatic pool cover system of Claim 3 further characterized in that the travel limiting means comprises a worm gear drive.

11 (Once Amended)

The automatic pool cover system of Claim 3 further characterized in that the travel limiting means comprises a hydraulic pump with an adjustable pressure relief valve.

12 (Once Amended)

The automatic pool cover system of Claim 3 further characterized in that <sup>the</sup> travel limiting [the] means comprises a hydraulic pump with an adjustable pressure transducer switch for controlling electrical power to a means for driving the hydraulic motor.

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13 (Once Amended)

BA  
An automatic pool cover system for operating a buoyant swimming pool cover and for moving same across a swimming pool to a closed position where the cover extends over the swimming pool and back to an opened position where the cover is wound upon a drum, said automatic pool cover system comprising:

- Al  
One.
- a) a drum upon which a buoyant swimming pool cover comprised of at least one buoyant panel is wound for storage when the pool cover is wound upon the drum to allow the swimming pool to be in an opened condition;
  - b) a hydraulic drive motor operatively connected to said drum for rotating same and causing a winding of the pool cover onto the drum in order to open the swimming pool;
  - c) an electrically operated power pack in a position remote from said pool cover and said hydraulic drive motor to provide a driving force for operating said hydraulic motor; and
  - d) hydraulic line means carrying only hydraulic fluid connected between said power pack and said hydraulic motor and with no electrical

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current connected between the power pack and the hydraulic motor or drum, such that said automatic pool cover system can operate a subaqueous cover drum and can be hydraulically operated, thereby electrically insulating the power pack from the hydraulic drive motor and thereby eliminating any electrical hazard at or in proximity to the swimming pool.

14 (Resubmitted)

The automatic pool cover system of Claim 13 further characterized in that said power pack includes a hydraulic pump in close proximity to said electric motor for operation by said electric motor.

15 (Resubmitted)

The automatic pool cover system of Claim 13 further characterized in that said drum is mounted on a drum shaft powered for rotation by said hydraulic motor in at least the wind-up direction to wind the pool cover onto the drum, and a brake means is operable with respect to said shaft when said pool cover is being unwound from said drum to move the cover to the closed

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position.

16 (Resubmitted)

The automatic pool cover system of Claim 15 further characterized in that a travel limiting device is operatively connected to said drum shaft and provides control for the end of travel positions of the pool cover in both the opened and the closed positions to thereby preclude a hard impact of the cover against any fixed object at the closed or opened positions.

17 (Resubmitted)

The automatic pool cover system of Claim 16 further characterized in that said travel limiting device has a traveler rotatable shaft, and brake means is operable to control speed of rotation of the drum when the cover is unwound from the drum from the same traveler rotatable shaft forming part of said travel limiting device.

18 (Resubmitted)

The automatic pool cover system of Claim 17 further characterized in that said drum is mounted for rotation on a drum shaft, and means couples the traveler shaft of said travel limiting



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device to the drum shaft, such that when a movable element forming part of the travel limiting device reaches an end position, it will automatically stop movement of the drum shaft.

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19 (Once Amended)

BBP  
An automatic pool cover system for moving a pool cover comprised of at least one buoyant panel to a closed position where the cover extends over a swimming pool and back from the closed position to an open position where the cover is wound upon a cover drum, said cover system comprising:

- Q1  
cont
- a) a drum for winding the cover onto the drum when the cover is being moved to the fully opened position allowing access to the swimming pool;
  - b) a travel limiting device for limiting rotation of the drum and stopping rotation of the drum at the closed position to thereby preclude an over-unwinding of the cover from the drum at a fixed end position thereat; and
  - c) brake means for controlling the speed of movement of the cover from the fully opened position where the cover is wound upon the drum to the closed position across the swimming pool, and which brake means operates in opposition to the action of the hydraulic motor when the latter is moving the cover to

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the fully opened position, said brake means providing a positive braking action to control movement of the cover unwinding from the drum as a result of buoyant forces and also operating to control the rate of movement of the cover from the opened position to the fully closed position.

20 (Resubmitted)

The automatic pool cover system of Claim 19 further characterized in that said brake means is a one way holding brake.

21 (Resubmitted)

The automatic pool cover system of Claim 19 further characterized in that said brake means comprises a counter balance valve and return check valve operating in a reverse direction.

22 (Resubmitted)

The automatic pool cover system of Claim 19 further characterized in that said brake means comprises a drive ratio brake operating in conjunction with the travel limiting device.

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23 (Resubmitted)

*Best*

The automatic pool cover system of Claim 19 further characterized in that a hydraulic motor is connected to and rotates the cover drum, and said brake means comprises a brake internal in said motor and operates as a holding brake.

24 (Resubmitted)

*As Cont.*

The automatic pool cover system of Claim 19 further characterized in that the travel limiting device comprises a rotary shaft travel limiter with a mechanically engageable traveling nut.

25 (Resubmitted)

The automatic pool cover system of Claim 19 further characterized in that a hydraulic motor is coupled to said cover drum to rotate same, and the travel limiting device of the pool cover system comprises a rotary hard stop travel limiter with hydraulic poppet valves allowing diversion of pressure flow from the hydraulic motor.

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26 (Resubmitted)

The automatic pool cover system of Claim 19 further characterized in that a hydraulic motor is coupled to the cover drum for rotating same to wind the cover onto the drum, and the travel limiting device comprises a pressure relief valve operating in conjunction with the hydraulic motor.

27. (Once Amended)

In an automatic pool cover system moving a buoyant cover wound upon a drum between a fully opened end position and a fully closed end position, an improvement comprising a travel limiting device for controlling movement of the pool cover so that it does not excessively unwind from the drum when the cover reaches at least at one end position, said travel limiting device having a travel limiter element moving a travel limiting distance between two travel limiting end positions on the travel limiting device and which travel limiting distance is representative of a cover movement distance between end positions of and proportional to the cover movement distance of the cover between the opened and closed end positions of the cover, said traveler limiter element engaging with travel limiting end positions when the cover reaches its end positions of movement and thereby precluding any over-winding of the cover at either of the fully opened position or fully closed position.

28 (Once Amended)

The improvement in the automatic pool cover system of Claim 27 further characterized in that said pool cover is comprised of a plurality of at least one buoyant panel.

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*Pl  
cont..*

29 (Once Amended)

A travel limiting device for controlling movement of a pool cover between a closed end position and an opened end position, said travel limiting device comprising:

a) a housing;

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- Q1  
Cont
- b) a travel limiter shaft extending through said housing;
  - c) a traveler element movable on said travel limiter shaft and translating movement therealong in response to rotation of one of said shaft or said traveler element;
  - d) A first fixed contact element in said travel limiting device housing representing one end position of travel of the pool cover and which traveler contacts the first fixed contact element when the cover reaches a first end position of travel across the swimming pool; and
  - e) a second fixed contact element in said housing representing an opposite end position of travel of the pool cover and which traveler element contacts the second fixed contact element substantially with the cover reaching a second end position of travel across the swimming pool.



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30 (Once Amended)

The time limiting device of Claim 29 further characterized in that said traveler element translates axially along said shaft through threaded engagement of said traveler element with said travel limiter shaft and which is keyed with respect to said housing to preclude rotation of said traveler element.

31 (Once Amended)

*By  
Cmt*  
The time limiting device of Claim 29 further characterized in that adjustment means is provided for adjusting the first and second end positions of the travelerelement to coincide with the respective end positions of movement of the pool cover.

32 (Once Amended)

The time limiting device of Claim 29 further characterized in that first adjustment means is provided for adjusting one end position of the traveler element to coincide with a first end position of the pool cover, and second adjustment means is provided for adjusting the second end position of the traveler element to coincide with a second end position of the pool cover.

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33 (Once Amended)

The time limiting device of Claim 29 further characterized in that said pool cover is wound upon a drum and said travel limiter shaft is mechanically coupled to a shaft which supports said drum so that movement of the drum is directly coupled to and proportional to movement of the travel limiter shaft and movement of the traveler element thereon.

34 (Once Amended)

*Q1*  
*Ans*  
The time limiting device of Claim 33 further characterized in that a clutch is mounted on said travel limiter shaft and a brake disc is rotatable on said travel limiter shaft in a first direction but free wheeling on the shaft in another direction and a braking means is provided for engagement with said disc to brake the movement of the disc when rotating in said first direction.

35 (Once Amended)

The time limiting device of Claim 29 further characterized in that said housing is cylindrically shaped and provided with an axially extending cylindrically shaped bore and said traveler element is shiftable within said housing in close proximity to the interior of said bore.

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36 (Once Amended)

The time limiting device of Claim 30 further characterized in that said travel limiter shaft rotates until said traveler element engages and jams against the first contact element and travels in the opposite direction until it jams against said second contact element.

37 (Once Amended)

The time limiting device of Claim 29 further characterized in that said first contact element operates control valves to control the operation of said hydraulic motor.

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38 (Once Amended)

An automatic pool cover system for operating a buoyant pool cover and where the cover is controlled in both opening and closing movements of said cover relative to a swimming pool, said pool cover system comprising:

- a) a rotatable cover drum for winding a buoyant cover comprised of at least one buoyant panel onto said drum and allowing unwinding of the cover from the drum to a closed position so that the cover may extend across and cover the swimming pool;
- b) a hydraulic motor for causing a winding of the pool cover across a swimming pool to an open position and onto the rotatable cover drum; and
- c) a positive action brake means operatively coupled to said cover drum to control a rate of movement of the cover when winding from the cover drum to extend the cover over a swimming pool and to preclude further unwinding when the cover has reached an end position of travel.

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39 (Resubmitted)

The automatic pool cover system of Claim 38 further characterized that said hydraulic motor is operated by an electrical power pack remote from the hydraulic motor and from the swimming pool.

40 (Once Amended)

*Q1*  
*Amended*  
The automatic pool cover system of Claim 38 further characterized in that said cover drum is located in a position where it is submerged in water and buoyant forces act upon the cover wound upon said drum which tend to cause an unwinding thereof, and said movement control means controls movement resulting from the tendency of the cover to unwind from said cover drum.

41 (Resubmitted)

The automatic pool cover system of Claim 40 further characterized in that said brake means for controlling movement is a one way brake device.

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42 (Resubmitted)

The automatic pool cover system of Claim 40 further characterized in that said brake means comprises an internal brake in said hydraulic motor.

Q1  
W2

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FIG. 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 (Once Amended)

In an automatic pool cover system using a cover comprised of at least one buoyant panel and which system moves the cover between a fully opened position and a fully closed position, a travel limiting device for controlling movement of the pool cover so that it reaches a fixed end position without causing the cover to engage an obstruction with a hard impact at said end position and preclude over-winding or unwinding thereat, an improvement comprising;

- a) a housing;
- b) a traveler arranged for movement in said housing;
- c) a first contact element in said housing representing an end position of travel of the pool cover and which traveler contacts the first contact element essentially at the same time the cover reaches a first limit of travel across the swimming pool; and
- d) a second contact element in said housing representing an opposite end position of travel of the pool cover and which traveler contacts the second contact element essentially at the same time the cover reaches

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a second limit of travel across the swimming pool in the opposite direction.

44 (Resubmitted)

Q1 The improvement in the automatic pool cover system of Claim 43 further characterized in that first adjustment means is provided for adjusting one end position of the traveler to coincide with a first limit of travel of the pool cover and second adjustment means is provided for adjusting a second end position of the traveler to coincide with a second limit of travel of the pool cover.

45 (Resubmitted)

The improvement in the automatic pool cover system of Claim 44 further characterized in that said traveler is mechanically coupled to a cover drum so that movement of the drum is directly coupled to and proportional to movement of the traveler.



46 (Once Amended)

1 BSA >  
A method of operating a swimming pool cover comprised of at least one buoyant panel which is capable of extending to a closed position over a swimming pool and to an opened position where it is wound upon a cover drum and where the rate of movement of the cover is controlled during such movement at least to the closed position, said method comprising:

- Q1  
Wme
- a) providing a rotating power to said cover drum for rotating same at least in a wind-up direction to rotate the pool cover about the drum and which is powered for rotation only from a hydraulic power source at or in proximity to said swimming pool;
  - b) providing a braking action to said drum when the cover is unwinding from the drum to a closed position across the swimming pool to thereby control the rate of movement of the cover during movement to the closed position; and
  - c) controlling the limits of movement of the cover to the opened position and the closed position through a member associated with the

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BB  
C  
drum moving said member a distance proportional to the limits of movement of the cover from the opened position to the closed position to thereby preclude an over-winding onto or an over unwinding of the cover from the drum at such end positions.

47 (Once Amended)

Q1  
C  
The method of Claim 46 further characterized in that said method comprises providing hydraulic fluid under pressure to a hydraulic motor located at or in proximity to said drum and which causes rotation of said drum, said hydraulic fluid being provided from an electrically operated power source at a remote location.

48 (Once Amended)

The method of Claim 46 further characterized in that said method comprises determining an end position of movement of the cover at a remote location simultaneously with the providing of a braking action, such that the limit of travel of the cover to the closed position is directly coordinated with the braking action therefor.

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49 (Once Amended)

A control system for controlling operation of an automatic pool cover assembly and which controls movement of a pool cover having at least one buoyant panel across said swimming pool, said control system comprising:

- Al  
Wst
- a) a fluid operated motor for providing powered movement to the pool cover;
  - b) a travel limiting mechanism for controlling the movement of the pool cover in at least one direction to preclude over movement and to preclude hard impact of the pool cover against a fixed obstruction when the pool cover reaches an end position;
  - c) a power pack remotely located with respect to said pool cover and said fluid operated motor and providing fluid power to said fluid motor;
  - d) latching means operatively connected to an electric motor forming part of said power pack in response to actuation of a manual control therefor; and
  - e) a relay means operatively connected to said latching means for controlling operation of

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said fluid motor in response to actuation of a manual control therefor.

50 (Resubmitted)

The control system of Claim 49 further characterized in that a pump is connected to said power pack and is also operatively connected to said fluid operated motor for providing fluid under pressure to said motor.

51 (Resubmitted)

The control system of Claim 50 further characterized in that biased switch means is connected to the output of said pump for controlling the delivery of fluid in opposite directions to said fluid operated motor.

52 (Resubmitted)

The control system of Claim 49 further characterized in that the fluid operated motor is a hydraulic brake motor having an internal brake retained by spring pressure and releasable upon pressure to the hydraulic motor.

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53 (Resubmitted)

The control system of Claim 49 further characterized in that said fluid operated motor is a braking motor and that a counter balance valve is connected to said braking motor.

54 (Resubmitted)

*Al  
Cmt*  
The control system of Claim 49 further characterized in that a ratchet and pawl mechanism is connected to said fluid operated motor in order to preclude operation in one direction but to allow operation in the opposite direction.

55 (Resubmitted)

The control system of Claim 49 further characterized in that a two way-two position hydraulic valve is operatively connected to the travel limiting mechanism, such that flow of hydraulic fluid to the motor can be blocked when the valve is in one position and fluid flow resumed when the valve is in the other position.

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NT 15.17

56 (Once Amended)

A travel limiting device for controlling limits of movement of a pool cover between a closed end position and an open end position, said travel limiting device comprising:

- a) a housing;
- b) a travel limiter movable within said housing between a first travel limiter end position of travel and a second travel limiter end position of travel;
- c) a first contact element in said housing and representing and being located to define one end position of travel of the pool cover when said travel limiter contacts the first contact element and which occurs simultaneously with the pool cover reaching a first end position of travel of the pool cover, and a second contact element in said housing and representing and being located to define an opposite end position of travel of the pool cover, and said travel limiter contacting the second contact element when the cover reaches the second end position of travel of the

Q1  
Cont

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cover; and

- d) mechanical limit switch actuators operatively associated with said traveler and operable to open and close control valves to allow and block fluid flow and thereby preclude over travel of the cover when it reaches an end position.

57 (Once Amended)

The travel limiting device of Claim 56 further characterized in that said mechanical limit switch actuators each comprises rotating shafts with movable members threadedly mounted thereon for movement between end positions on said threaded shafts, and means for precluding rotation of said members on the threaded shafts when they reach an end position thereon.

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58 (Once Amended)

A fluid operated ratchet and pawl mechanism which is actuated in response to a fluid signal, said mechanism comprising:

- Q1  
Wrt
- a) a rotatably located ratchet;
  - b) a pawl engageable with recesses on said ratchet and being biased to a first position or a second position and where one is a position of engagement and the other position is a position of disengagement with the ratchet; and
  - c) a fluid actuator operatively connected to said pawl and causing movement of the pawl upon receipt of a fluid signal to the position other than that to which it is biased.

59 (Resubmitted)

The fluid operated ratchet and pawl mechanism of Claim 58 further characterized in that said fluid operated mechanism is hydraulically operated and said actuator is a hydraulically operated actuator. ✓



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60 (Resubmitted)

The fluid operated ratchet and pawl mechanism of Claim 58 further characterized in that said pawl is biased to one position about a pivot point on which said pawl is supported.

61 (Once Amended)

*Q1 cont*  
The fluid operated ratchet and pawl mechanism of Claim 58 further characterized in that a spring means biases the pawl to the to the first position and the fluid actuator moves the pawl to the second position.

62 (Resubmitted)

The fluid operated ratchet and pawl mechanism of Claim 60 further characterized in that said actuator comprises a hydraulic cylinder with a plunger engageable with said pawl.

63 (Once Amended)

The fluid operated ratchet and pawl mechanism of Claim 58 further characterized in that the ratchet and pawl mechanism is used with an automatic pool cover system for moving a buoyant pool cover and provides a releasable braking action to a cover drum for the pool cover.

64 (New Claim)

An automatic pool cover system for operating a slat type cover and where the cover is controlled in both opening and closing movements of said cover relative to a swimming pool, said pool cover system comprising:

- Q2
- a) a rotatable cover drum [for winding a slat type cover comprised of a plurality of interconnected and relatively rigid buoyant slats onto said drum and allowing unwinding of the cover from the drum to a closed position so that the cover may extend across and cover the swimming pool];
  - b) a hydraulic motor [for causing driving movement of the pool cover across a swimming pool to an open position and winding the cover onto the cover drum];
  - c) movement control means operatively coupled to said cover drum to control a rate of movement of the cover from the cover drum [to extend the cover over a swimming pool];
  - d) a travel limiter housing;
  - e) a travel limiter shaft extending through said

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housing;

- f) traveler element movable on said travel limiter shaft and translating movement therealong in response to rotation of either one of said shaft or said element;
- g) a first fixed contact element in said travel limiter housing representing one end position of travel of the pool cover and which traveler element contacts the first fixed contact element when the cover reaches a first end position of travel across the swimming pool; and
- h) a second fixed contact element in said housing representing an opposite end position of travel of the pool cover and which traveler element contacts the second fixed contact element substantially with the cover reaching a second end position of travel across a swimming pool.

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65 (New) Claim)


The automatic pool cover system of Claim 64 further characterized in that said cover drum is located in a position where it is submerged in water and buoyant forces act upon the cover wound upon said drum to cause an unwinding thereof, and said movement control means controls movement resulting from the tendency of the cover to unwind from said cover drum.

66

*Q2  
Cont:*

The automatic pool cover system of Claim 64 further characterized in that the hydraulic motor is operated by an electrical power pack remote from the hydraulic motor and from the swimming pool, hydraulic lines means carrying only hydraulic fluid connected between said power pack and said hydraulic motor and with no electrical current connected between the power pack and the hydraulic motor or drum, such that the automatic pool cover system can operate a subaqueous cover and can be hydraulically operated, thereby electrically insulating the power pack from the hydraulic drive motor and eliminating electrical hazard at or in proximity to the swimming pool.

An automatic pool cover system for operating a slat type cover and where the cover is controlled in both opening and closing movements of said cover relative to a swimming pool, said pool cover system comprising:

- 
- a) a rotatable cover drum for winding a slat type cover comprised of a plurality of interconnected and relatively rigid buoyant slats onto said drum and allowing unwinding of the cover from the drum to a closed position so that the cover may extend across and cover the swimming pool;
  - b) a hydraulic motor for causing driving movement of the pool cover across a swimming pool to an open position and winding the cover onto the cover drum;
  - c) movement control means operatively coupled to said cover drum to control a rate of movement of the cover from the cover drum to extend the cover over a swimming pool;
  - d) an electrical power pack remote from said hydraulic motor and from the swimming pool and

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being operatively connected by hydraulic lines to said hydraulic motor for driving same;

- As Cont.
- e) a travel limiter housing;
  - f) a travel limiter shaft extending through said housing;
  - g) traveler element movable on said travel limiter shaft and translating movement therealong in response to rotation of either one of said shaft or said element;
  - h) a first fixed contact element in said travel limiter housing representing one end position of travel of the pool cover and which traveler element contacts the first fixed contact element when the cover reaches a first end position of travel across the swimming pool;
  - i) a second fixed contact element in said housing representing an opposite end position of travel of the pool cover and which traveler element contacts the second fixed contact element substantially with the cover reaching a second end position of travel across a swimming pool;

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- j) latching means operatively connected to said electric motor forming part of said power pack and which latching means is operable in response to actuation of a manual control therefor; and
- k) a relay means operatively connected to said latching means for controlling operation of said hydraulic motor and responsive to actuation of the manual control therefor.

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